

SECTION 15455

HELIUM AND NITROGEN SYSTEM TUBING & COMPONENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes piping and specialties for distribution of the following Process Gas systems operating at 200 psig (1380 kPa) and less:
 - 1. Nitrogen (N₂)
- B. This Section does not include the following:
 - 1. Compressors, Receivers, Dryers, Storage, or any other equipment related to generating the Process Gases listed above.
 - 2. Piping for equipment related to generating the Process Gases listed above.
- C. Related Sections include the following:
 - 1. Division 15 Section 15050 "Piping Systems".
 - 2. Division 15 Section 15052 "Brazing".
 - 3. Division 15 Section 15072 "Cleaning"
 - 4. Division 15 Section 15073 "Pressure Leak Testing".
 - 5. Division 15 Section 15074 "Mechanical Identification" for piping and specialty labels.

1.3 REFERENCES

- A. PTFE: Polytetrafluoroethylene.

1.4 SUBMITTALS

- A. Coordination Drawings: For Process Gas piping and specialties, including relationship to other services that serve same work areas, in 1/4" = 1'-0" scale.
- B. Detailed Schedules
- C. Cleaning and testing procedures, and test results.
- D. Equipment Drawings: Manufacturer's drawings of filters, dryers, instruments, valves and other specialty items.

1.5 QUALITY ASSURANCE

- A. Provide listing/approval stamp, label, or other marking on equipment made to specified standards.
- B. Listing and Labeling: Provide equipment and accessories specified in this Section that are listed and labeled.
 - 1. Terms "Listed" and "Labeled": As defined in National Electrical Code, Article 100.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store cleaned and sealed tubing, valves and fittings in a clean and sheltered location.
- B. Label pipe, fittings, valves and specialties that have not been pre-cleaned or that have been pre-cleaned but have seal or packaging that is not intact, with temporary labels indicating that cleaning is required before installation. Cleaning and re-cleaning shall be paid for by the Contractor.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products by one of the following:
 - 1. Process Gases, General Duty Valves:
 - a. Nibco, Inc.
 - b. Parker Hannifin Corporation
 - c. Swagelok Company
 - d. Watts Regulator Company.

2.2 PIPING, GENERAL

- A. ASME Code Compliance: Provide Process Gases piping components complying with ASME B31.9, "Building Services Piping".

2.3 PIPES AND TUBES

- A. Copper Tube: ASTM B 88, Type L (ASTM B 88M, Type B), seamless, hard-drawn temper, cleaned for oxygen/electronic service, and nitrogen-purged at the factory per NFPA 56F and sealed. Interior surface to be shiny bright with no interior discoloration.
 - 1. Hydrogen Service System shall be brazed. The use of threaded fittings for Hydrogen Service is not allowed.

2.4 PIPE AND TUBE FITTINGS

- A. Copper Tube Fittings: ASME B16.22, wrought copper or copper alloy, solder joint, pressure type, cleaned and bagged for oxygen/electronic service. Interior surface to be shiny bright with no interior discolorations.
- B. Bronze Tube Flanges: ASME B 16.24, Classes 150 and 300.
- C. Transition Fittings: Type, Material, and end connections to match pipe being joined.

2.5 JOINING MATERIALS

- A. Refer to Division 15 Section 15050 "Piping Systems" for joining material not in this section.

2.6 VALVES

- A. General-Duty Valves: Refer to Division 15 Section 15100 "Valves" for Process Gases service valves not specified in this Section and for valves for other fluids.
- B. Special-Duty, Process Gases Valves: Include PTFE seats and comply with the following:
 - 1. Ball Valves, 2 Inch NPS (DN 50) and Smaller: MSS SP-110; 3 piece bronze body with blowout-proof stem, full port; stainless steel ball; threaded ends; and 600 psig (4140 kPa) minimum WOG pressure rating.

SECTION 15455

HELIUM AND NITROGEN SYSTEM TUBING & COMPONENTS

2. Butterfly Valves, 2½ Inch NPS (DN 65) and Larger: MSS SP-67; Type I (bubble tight); single flange (lug type), cast iron body with ductile iron disc, and 200 psig (1380 kPa) minimum WOG pressure rating.
3. Check Valves, 2 Inch NPS (DN 50) and Smaller: MSS SP-80; Type 4 or non-standard T-pattern, swing check; Class 125, bronze body with composition-to-metal seat and threaded ends.
4. Check Valves, 2½ Inch NPS (DN 65) and Larger: MSS SP-71, Type II full-waterway or Type IV clear-waterway, cast iron body with composition-to-metal seat and flanged ends.
5. Globe Valves, 2 Inch NPS (DN 50) and Smaller: MSS SP-80, Class 125, Type 2, bronze body with composition-to-metal seat and threaded ends.

2.7 SPECIALTIES

- A. Safety Valves: ASME boiler and Pressure Vessel Code, Section VIII, "Pressure Vessels" construction, National Board certified, labeled, and factory sealed; constructed of bronze body with poppet safety valve for compressed air service.
 1. Pressure Settings: Higher than discharge pressure and same or lower than receiver pressure rating.
- B. Pressure Regulators: Bronze body, direct acting, spring loaded manual pressure setting adjustment, and rated for 250 psig (1725 kPa) inlet pressure, except where otherwise indicated.
 1. Type: Diaphragm operated.
 2. Type: Pilot operated.
- C. Pressure Regulators: Aluminum alloy or plastic body, diaphragm operated, direct acting, spring loaded, manual pressure setting adjustment, and rated for 250 psig (1725 kPa) inlet pressure, except where otherwise indicated.
- D. Filters
- E. Hose, Clamps, and Couplings: Provide compatible hose, hose clamps, and hose couplings, suitable for Process Gases service, of nominal diameter, and rated for 300 psig (2070 kPa) minimum working pressure, except where otherwise indicated.
 1. Hose:
 2. Hose Clamps: Stainless steel

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. ASME Code Compliance: Provide Process Gases piping components complying with the following:
 1. Process Gases Piping: ASME B31.9, "Building Services Piping".
- B. Install flanges, union, transitions and special fittings, and valves with pressure ratings same or higher than system pressure rating used in applications below, except where otherwise specified.
- C. Process Gases Distribution Piping: Use the following:

1. 1½ Inch NPS (DN 40) and Smaller: Copper tube, copper tube fittings, Class 300 bronze tube flanges, and brazed and flanged joints.
2. 2 to 4 Inch NPS (DN 50 to DN 100): Copper tube, copper tube fittings, Class 300 bronze tube flanges, and brazed and flanged joints.

3.2 VALVE APPLICATIONS

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 1. Shut-off Duty : Use ball or butterfly valves.
 2. Throttling Duty: Use globe or butterfly valves.
 3. Process Gases Supply to Equipment: Locking handle, safety exhaust ball valves.

3.3 PIPING INSTALLATION, GENERAL

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.
- B. Install eccentric reducers where pipe is reduced in size in direction of air flow, with bottoms of both pipes and reducer flush.
- C. Connect branch air to mains from top of main. Provide drain leg and drain trap at end of each main, branch, and low point in piping.
- D. Install supports and anchors according to Division 15 Section 15050 "Piping Systems". Do not exceed the following spacing between pipe hangers:
 1. Copper Tube: For the following sizes:
 - a. 1¼ Inch NPS (DN 32) and Smaller: 6 feet (1.8 m) horizontal and 10 feet (3 m) vertical.
 - b. 1½ Inch NPS (DN 40) and Larger: 10 feet (3 m) horizontal and 10 feet (3 m) vertical.
- E. Install valves according to Division 15 Section "Valves".
- F. Install expansion joints and anchors according to Division 15 Section 15050 "Piping Systems".
- G. Install thermometers and pressure gauges according to Division 15 Section 15950 "Direct Digital Controls Systems".

3.4 JOINT CONSTRUCTION

- A. Refer to Division 15 Section 15050 "Piping Systems" for basic piping joint construction.
- B. Grooved-End, Mechanical-Coupling Joints: Follow grooved-end mechanical coupling manufacturer's written instructions.
- C. Press-Sealed Joints: Follow press-seal fitting manufacturer's written instructions.
- D. Dissimilar Material Piping Joints: Make joints using adapters compatible with both piping materials.

3.5 CONNECTIONS

- A. Install piping next to equipment and accessories to allow service and maintenance.
- B. Connect air piping to equipment and accessories with unions and shut-off valves. Install with strainers where indicated.

SECTION 15455

HELIUM AND NITROGEN SYSTEM TUBING & COMPONENTS

1. Install thermometers where indicated.
 2. Install pressure gages where indicated.
- C. Install specialties as indicated.

3.6 FIELD QUALITY CONTROL

- A. Test and adjust piping safety controls. Replace damaged and malfunctioning controls.
- B. Piping System Tests: Test new and modified parts of existing piping. Cap and fill Process Gases piping with oil-free, dry air, or gaseous nitrogen to pressure of 50 psig (345 kPa) above system operating pressure, but not less than 150 psig (1035 kPa). Isolate test source and let stand for 4 hours to equalize temperature. Refill system, if required, to test pressure and hold pressure for 2 hours with no drop in pressure.
1. Repair leaks and defects with new materials and re-test system until satisfactory results are obtained.

3.7 COMMISSIONING

- A. Perform the following final checks before startup.
1. Verify that specified test of piping are completed.
 2. Check for piping connection leaks.
 3. Check for proper seismic restraints.

END OF SECTION